

June 20, 2006

Problem Solving:

Visible Signaling in Large Spaces

Executive Overview

For fire alarm system designers, including engineers and dealers, of notification appliances, strobes in retail occupancies (warehouses, super stores, etc.) have voiced questions or concerns about the correct spacing and candela settings of strobes in retail occupancies – even though these strobes were installed according to NFPA 72 standards. This document details the study and recommendation by the *Technical Committee on Notification Appliances for Fire Alarm Systems* that will be printed in Annex A of the 2007 edition of NFPA 72. Their recommendation will clarify the design requirements of signaling systems in retail occupancies.

Industry Challenges

NFPA 72 states that indirect and direct viewing of the light from visible signaling appliances must exist. In other words, occupants do not need to see a strobe directly to be alerted, but merely see its effects, such as reflections off walls and furnishings. However, the testing that led to this requirement was done in areas with lighting levels far below those used in retail occupancies. This means that the signal-to-noise ratio (the illumination from the strobe compared with the illumination of the space without the strobe) in retail is much lower, thereby reducing the effect of indirect signaling. Because of this, some Authorities Having Jurisdiction even require strobe coverage in excess of the prescriptive tables outlined in NFPA 72.

Because the fire protection community is so large and widespread and because requirements and recommendations are continually changing, communicating technical developments is difficult.

The purpose of this document is to inform fire alarm system designers of the recommendation by the *Technical Committee on Notification Appliances for Fire Alarm Systems* that will be printed in Annex A of the 2007 edition of NFPA 72.

Recommendations for Designing Signaling Systems in Retail Occupancies

In the 2007 edition of NFPA 72, Annex A will clarify how the design of signaling systems affect retail occupancies.

In the 2007 edition of NFPA 72, a recommendation by the *Technical Committee on Notification Appliances for Fire Alarm Systems* will be printed in Annex A that clarifies several factors affecting the design of signaling systems in retail occupancies, particularly big-box retail stores, such as Wal-Mart and The Home Depot.

As the basis for the recommendations, a study was sponsored by the Fire Protection Research Foundation. The tests were designed and conducted by R.P. Schifiliti Associates, Inc. with assistance and donations of time and equipment from several other organizations.

The study concluded:

- Despite the higher illumination (therefore lower signal-to-noise ratio) used in retail occupancies, there are still measurable effects due to both direct and indirect signaling when the prescriptive tables in NFPA 72, Chapter 7, are used to design the system. This means that using the tables will produce sufficient notification. This conclusion is derived from multiple tests completed by volunteer participants during normal business hours in three separate stores.
- Notification is more noticeable if the strobes are located directly over the aisles. However, in retail, this may not be practical in stores where the aisle locations are likely to change. In most stores, there are areas that do not tend to change, such as main aisles and areas near the cashiers. Annex A will recommend that strobes be placed directly over these areas.
- All stores have blind spots, areas with little or no effect from the strobes. These blind spots are not of great concern to committee members because there are redundant methods for occupant notification. For example, non-hearing impaired individuals are able to hear sounders or voice evacuation messages. Also, retail store occupants tend to be mobile and are likely to move into a position where they can see direct or indirect effects from a strobe. Stores usually provide multiple egress paths at any given location and do not have any “dead ends” that would trap an occupant.

NFPA 72, chapter 7 requirements still produce measurable effects.

In the 2007 edition of NFPA 72, Annex A will recommend placing strobes directly over aisles.

Blind spots are not of great concern.

Based on these conclusions, the *Technical Committee on Notification Appliances for Fire Alarm Systems* recommends several avenues for further investigation, such as:

- Determining the effect of mounting strobes in corridors higher than the prescribed 80 inches to 96 inches.
- Determining a reliable signal-to-noise ratio threshold for occupant notification.
- Determining the effect of ceiling clutter on the ability of a system to alert occupants.

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Conclusion

This addition in Annex A of NFPA 72 is part of the committee's ongoing effort to further increase the integrity of the code's recommendations by backing them with reputable research. NFPA 72 will continue to be enhanced in the future as more studies are completed.

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